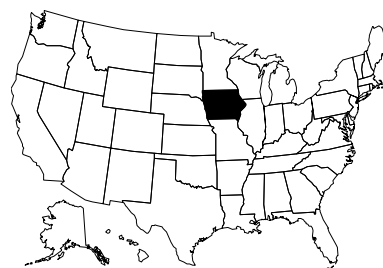


IOWA

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Program Description

Since 1994, the Iowa Department of Natural Resources (IDNR) and the University Hygienic Laboratory (UHL) have conducted a biological assessment program for Iowa's wadeable streams and rivers. So far, biological sampling has been conducted at 289 stream locations throughout the state. Biological data are collected for a variety of purposes including: ambient monitoring, problem investigation, evaluation of point source and nonpoint source pollution control measures, and TMDL development. The IDNR uses bioassessment information to assess the status of stream aquatic life designated uses for the Section 305(b) report and the Section 303(d) list of impaired waters.

Benthic macroinvertebrates and fish serve as indicators of stream biological integrity. Standardized sampling procedures are used to collect species composition and proportional abundance data from which a suite of biological metrics is calculated. Individual metric values are aggregated to obtain scores for the Benthic Macroinvertebrate Index of Biotic Integrity (BMIBI) and the Fish Index of Biotic Integrity (FIBI). Biological impairment thresholds are based on the statistical distribution of biotic index scores obtained from stream reference site sampling. Currently, the IDNR has identified 96 reference sites that represent least disturbed stream conditions in Iowa's ten ecological regions.

Until 2002, a targeted approach was used to select sampling locations for Iowa's stream biological assessment program. From 1994 through 1998, the program emphasized candidate reference site and test (impacted) site sampling, which provided data for evaluating and calibrating biological data metrics. From 1999-2001, the emphasis shifted toward site-specific problem investigation and follow-up. Beginning in 2002, IDNR and UHL are initiating a probabilistic survey that will provide an unbiased, statistically powerful assessment of Iowa's perennial streams and rivers. The survey design calls for sampling 56 randomly-selected sites per year through 2005. During this period, IDNR and UHL also plan to resample the existing network of reference streams at a rate of 20-25 sites per year.

The IDNR is working toward incorporating narrative and numeric stream biocriteria in Iowa's water quality standards. The bioassessment framework that is currently used for 305(b) assessments can potentially serve as a foundation for biocriteria. The 2002-2005 probabilistic survey will provide useful data from non-wadeable streams and rivers for biocriteria development. Biocriteria development for Iowa's lakes, reservoirs, and wetlands has not been initiated.

Documentation and Further Information

Water Quality in Iowa During 1998 and 1999 (Iowa's 2000 Section 305(b) report):
<http://www.state.ia.us/dnr/organiza/epd/wtrq/305b00/index.htm>

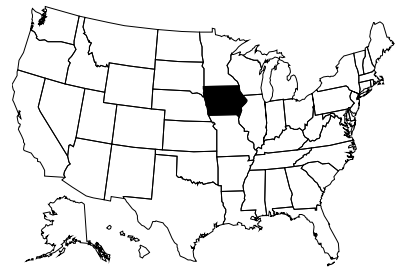
Final Approved Iowa 1998 303(d) List: <http://www.state.ia.us/dnr/organiza/epd/wtresrce/files/303dlist.pdf>

Iowa's STORET Database (ambient water quality program dataset): <http://wqm.igsb.uiowa.edu/storet/>

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Programmatic Elements

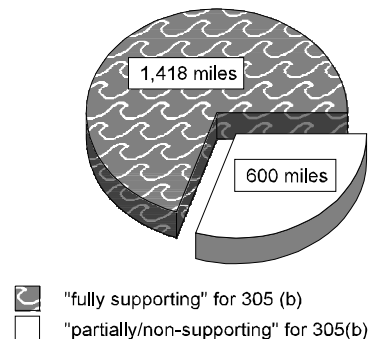
Uses of bioassessment within overall water quality program	<input checked="" type="checkbox"/>	problem identification (screening)
	<input checked="" type="checkbox"/>	nonpoint source assessments
	<input checked="" type="checkbox"/>	monitoring the effectiveness of BMPs
	<input checked="" type="checkbox"/>	ALU determinations/ambient monitoring
	<input type="checkbox"/>	promulgated into state water quality standards as biocriteria
	<input type="checkbox"/>	support of antidegradation
	<input type="checkbox"/>	evaluation of discharge permit conditions
	<input checked="" type="checkbox"/>	TMDL assessment and monitoring
	<input type="checkbox"/>	other:
Applicable monitoring designs*	<input checked="" type="checkbox"/>	targeted (i.e., sites selected for specific purpose) (<i>special projects, specific river basins or watersheds, comprehensive use throughout jurisdiction</i>)
	<input checked="" type="checkbox"/>	fixed station (i.e., water quality monitoring stations) (<i>specific river basins or watersheds</i>)
	<input type="checkbox"/>	probabilistic by stream order/catchment area
	<input checked="" type="checkbox"/>	probabilistic by ecoregion, or statewide (<i>comprehensive use throughout jurisdiction</i>)
	<input type="checkbox"/>	rotating basin
	<input type="checkbox"/>	other:

*In 2002, IDNR will initiate a REMAP probabilistic survey of perennial streams and rivers.

Stream Miles

Total miles	71,665
<i>(State based determination)</i>	
Total perennial miles	26,630
Total miles assessed for biology*	2,018
fully supporting for 305(b)	1,418
partially/non-supporting for 305(b)	600
listed for 303(d)	n/a
number of sites sampled	149
number of miles assessed per site	0.1 - 0.22

2,018 Miles Assessed for Biology



*Stream miles reported are based on Iowa's 2000 305(b) assessment. A 303(d) list was not prepared in 2000.

Aquatic Life Use (ALU) Designations and Decision-Making

ALU designation basis	Class System (A, B, C), Warm Water vs. Cold Water	
ALU designations in state water quality standards	Four designations: B(LR) - limited resource warmwater streams/rivers; B(WW) - significant resource warmwater streams/rivers; B(CW) - coldwater streams; B(LW) - lakes and wetlands	
Narrative Biocriteria in WQS	under development (Iowa's water quality standards include language associated with ALUs but it was not intended to be formal narrative biocriteria. IA is moving toward incorporating narrative biocriteria into the State's water quality standards.)	
Numeric Biocriteria in WQS	none (IA uses thresholds to report data in 305(b) report, but not formal numeric biocriteria.)	
Uses of bioassessment data in integrated assessments with other environmental data (e.g., toxicity testing and chemical specific criteria)	<input checked="" type="checkbox"/>	assessment of aquatic resources
	<input checked="" type="checkbox"/>	cause and effect determinations
	<input type="checkbox"/>	permitted discharges
	<input checked="" type="checkbox"/>	monitoring (e.g., improvements after mitigation)
	<input checked="" type="checkbox"/>	watershed based management
Uses of bioassessment/biocriteria in making management decisions regarding restoration of aquatic resources to a designated ALU	303(d) listing, to address point source impacts, and to support TMDL development	

Reference Site/Condition Development

Number of reference sites	96 total	
Reference site determinations	<input type="checkbox"/>	site-specific
	<input type="checkbox"/>	paired watersheds
	<input checked="" type="checkbox"/>	regional (aggregate of sites)
	<input checked="" type="checkbox"/>	professional judgment
	<input type="checkbox"/>	other:
Reference site criteria	Regionally representative and least disturbed by human activities, consider impact of livestock waste, wastewater, channel alterations, riparian land use, and quality of instream habitat	
Characterization of reference sites within a regional context	<input type="checkbox"/>	historical conditions
	<input checked="" type="checkbox"/>	least disturbed sites
	<input type="checkbox"/>	gradient response
	<input type="checkbox"/>	professional judgment
	<input type="checkbox"/>	other:
Stream stratification within regional reference conditions	<input checked="" type="checkbox"/>	ecoregions (or some aggregate)
	<input type="checkbox"/>	elevation
	<input type="checkbox"/>	stream type
	<input type="checkbox"/>	multivariate grouping
	<input type="checkbox"/>	jurisdictional (i.e., statewide)
	<input type="checkbox"/>	other:
Additional information	<input type="checkbox"/>	reference sites linked to ALU
	<input type="checkbox"/>	reference sites/condition referenced in water quality standards
	<input checked="" type="checkbox"/>	some reference sites represent acceptable human-induced conditions

Field and Lab Methods

Assemblages assessed	<input checked="" type="checkbox"/>	benthos (<i>100 - 500 samples per year; single season, multiple sites - broad coverage</i>)
	<input checked="" type="checkbox"/>	fish (<i><100 samples per year; single season, multiple sites - broad coverage</i>)
	<input type="checkbox"/>	periphyton
	<input type="checkbox"/>	other:
Benthos		
sampling gear		Surber, Hess, multiplate, collect by hand; 500 - 600 micron mesh
habitat selection		riffle/run (cobble), multihabitat, artificial substrate
subsample size		100 count, entire sample
taxonomy		combination - order, family, genus, species
Fish		
sampling gear		backpack electrofisher, pram unit (tote barge); 3/16" mesh
habitat selection		multihabitat
sample processing		anomalies, species abundance
subsample		none
taxonomy		species
Habitat assessments		visual based, quantitative measurements; performed with bioassessments
Quality assurance program elements		standard operating procedures, periodic meetings/training for biologists, taxonomic proficiency checks, specimen archival

Data Analysis and Interpretation

Data analysis tools and methods	<input checked="" type="checkbox"/>	summary tables, illustrative graphs
	<input checked="" type="checkbox"/>	parametric ANOVAs
	<input checked="" type="checkbox"/>	multivariate analysis (<i>for data exploration only</i>)
	<input checked="" type="checkbox"/>	biological metrics (<i>aggregate metrics into an index</i>)
	<input checked="" type="checkbox"/>	disturbance gradients
	<input type="checkbox"/>	other:
Multimetric thresholds		
transforming metrics into unitless scores		linear interpolation between optimum (95%) reference population level and the minimum level
defining impairment in a multimetric index		25 th percentile of reference population
Evaluation of performance characteristics	<input checked="" type="checkbox"/>	repeat sampling
	<input checked="" type="checkbox"/>	precision
	<input checked="" type="checkbox"/>	sensitivity
	<input type="checkbox"/>	bias
	<input type="checkbox"/>	accuracy
Biological data		
Storage		EDAS (benthic macroinvertebrate data) and MS Access (fish, physical habitat, and water chemistry data)
Retrieval and analysis		STATISTIX (Analytical Software) and Excel